



(MABI 2003)

## PART 2: CONTEXT FOR MANAGEMENT

- 2.1 Overview of the Mount Tom Forest**
- 2.2 Man and Nature on Mount Tom**
- 2.3 Challenges in Developing and Applying an Integrated Management Approach for the Mount Tom Forest**

## PART 2:

# CONTEXT FOR MANAGEMENT

The Mount Tom Forest is a nationally significant cultural landscape. It is a living record of the beginnings of scientific forestry in the United States and the progression of forest management techniques over the past 135 years. The Forest is also a landscape that has been influenced by and continues to evolve as a complex ecological system, propelled by the dynamic processes of natural succession.

This chapter explores how Mount Tom's cultural and natural histories have co-evolved and mutually influenced the composition and character of the landscape that can be experienced today.

The complex interactions of these cultural and natural forces pose unique opportunities and challenges in developing a forest management plan for Mount Tom. These challenges are discussed at the end of this chapter.



From top: Red pines in Stand #4 (MABI 1998); sugar maple bordering the Elm Lot (OCLP 2003); view east from the Summer Pasture (MABI 2000); portable mill in Upper Meadow (MABI 2003).



## 2.1 OVERVIEW OF THE MOUNT TOM FOREST

This section provides a brief overview of the cultural and ecological history that has shaped the Mount Tom Forest. More in-depth descriptions about the Forest's historical significance, cultural features, and ecological conditions can be found in Part 4: Description of the Mount Tom Forest.

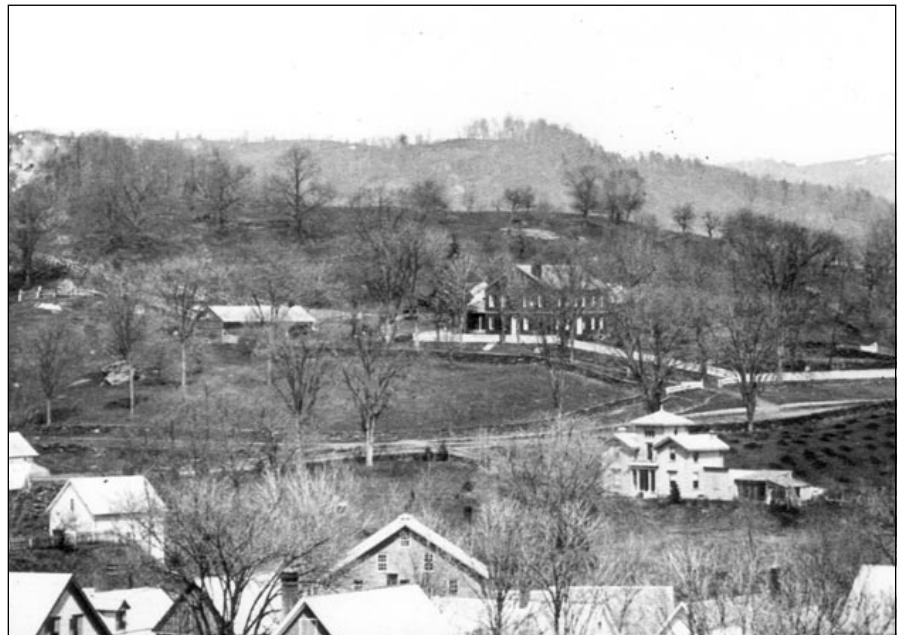
### 2.1.1 CULTURAL HISTORY

George Perkins Marsh grew up on the property that is now the Park during a time of enormous social and environmental upheaval. By the mid-nineteenth century, Mount Tom, like thousands of other once-forested landscapes in New England, had been cleared for farms, potash, and firewood. In the 1830s the opening of commercial wool markets ignited the merino sheep farming boom and precipitated one of Vermont's earliest environmental catastrophes. Woodlands were cleared to meet the increasing demand for sheep pasture and fences—almost 8,000 wooden rails were needed to enclose a 40-acre pasture. In a historical blink of an eye, places like Woodstock's Mount Tom were stripped of most of their vegetation, then were quickly eroded and left deeply gullied and infertile. Upland topsoils were washed into streams and rivers, threatening drinking water and creating massive fish kills. Meanwhile, struggling lowland villages were afflicted by frequent mudslides and flooding. Both George Perkins Marsh and Frederick Billings witnessed this rapid degradation of the Vermont landscape. Years later, while serving as U.S. Ambassador to Italy, Marsh wrote passionately about the consequences of deforestation and argued for a new ethic of stewardship in his 1864 landmark book, *Man and Nature*.

Frederick Billings, a Vermont native, lawyer, railroad executive and pioneer conservationist, purchased the Marsh property, including much of Mount Tom, in 1869. Billings was a believer in material progress and sustainable use, an outlook characteristic of American conservation up through the middle of the twentieth century. In the West, he had directed efforts to encourage settlement and commerce along the route of the Northern Pacific Railroad by planting trees,

The Forest contributes to the historical significance of the property, most notably:

- For its association with American conservationists George Perkins Marsh, Frederick Billings, and Laurance Rockefeller for the period of 1801 to 1997
- As an example of pioneering nineteenth-century forestry from 1873 to 1910 and an example of continuous private forest management up through 1997
- As an example of landscape design during the Country Place Era from 1870 to 1930, and as part of a late-nineteenth-century model farm.



View of the Marsh Place looking north over Woodstock village in 1869. (Woodstock Historical Society)

"I spent my early life almost literally in the woods; a large portion of the territory of Vermont was, within my recollection, covered with the natural forest; and having been personally engaged to a considerable extent in clearing lands, and manufacturing, and dealing in lumber, I have had occasion both to observe and to feel the effects resulting from an injudicious system of managing woodlands and the products of the forest."

George Perkins Marsh in a letter to botanist Asa Gray, 1849



**Billings Estate spruce plantation featured in the periodical *American Forests* (February 1910). Pictured is George Aitken (1852-1910), Manager of the Billings Farm. (MABI)**

building windbreaks, and establishing various initiatives to stimulate rural development. In Woodstock, Billings set about creating a farm and forest on the former Marsh property that would serve as a model of land stewardship and sustainability for the depressed agricultural economy of his home state. He harbored a vision of social improvement and rural recovery based in part on reforestation, agricultural improvement, and conservation. As Billings was planting trees by the thousands, he simultaneously developed 12 miles of carriage roads to showcase his pioneer forestry work and provide picturesque drives for the public to enjoy. His

approach to the estate's development exemplified nineteenth-century landscape design sensibilities, which strove to create landscapes that were as useful as they were beautiful and inspiring.

"[Frederick] would plant trees in the Spring of the year, determining to cover the hills with forest. He was quite fond of going around and working with his men. He was led to consider forestry by reading the writings of Geo. P. Marsh regarding climate changes induced by devastation of the forests...His example has caused many farmers here to plant trees on the barren hillsides and has therefore proved vary valuable."

Julia Parmly Billings

When Billings started this bold experiment, forestry was not yet an established profession in America. He and his professional farm manager, George Aitken, used scientific practices borrowed from nineteenth-century European forestry, drawing heavily on Billings' personal library of German and French forestry texts. The earliest plantations established by Billings on Mount Tom were Norway spruce and European larch—fast-growing European species thought to be best suited for the New England climate. The use of these species is one demonstration of the dominant influence of European scientific forestry on the nascent profession in America. In other places on the property Billings experimented with plantations of native trees (such as white pine), or simply cultivated trees that were naturally regenerating and occasionally planting desirable native hardwood species in regenerating areas.

**Sustainable Forest Management:** Billings' approach to forest management drew upon the best current thinking and practices of his time to heal the landscape, cultivate a productive forest, and provide economic stability to local communities. His approach constituted what would now be considered "sustainable forest management," although this phrase would not be coined until later in the twentieth-century.

In a contemporary context, the understanding of sustainable forest management has deepened to include a greater emphasis on protecting and enhancing environmental values while allowing for continual production of quality wood. (See Lansky 2003 and McEvoy 2004 for examples.)

As is true for the term "best current thinking and practices of forest management" described in section 1.3, our understanding of what constitutes sustainable forest management and the means by which we practice it will continue to evolve as the science of forestry advances.

Billings' scientific forestry program on worn-out agricultural lands influenced other efforts of forestry conservation throughout Vermont and the New England region. Billings promoted the first state commission to study forestry in Vermont, and was a principal author of its final report that emphasized the role of forestry in the revitalization of rural Vermont. In the context of American conservation history, his forestry work was farsighted and pioneering for its time.

After Frederick Billings' death in 1890, his wife and daughters continued to develop his forestry program on Mount Tom. Their work coincided with the rapid growth of the forestry profession in America and rise of forest conservation in the public sector, particularly with the establishment of municipal, state and national reforestation programs. The Billings women applied reforestation and forest management techniques that drew upon the best science and management practices of their time, practices that were being developed and disseminated through Vermont state forestry programs and tree nurseries. The plantations established during this time included both native white pines and red pines that would dominate the twentieth-century reforestation techniques in the northeastern U.S.



Red Pine plantation (Stand #26) planted in 1917 along the North Ridge. (OCLP 2003)

Reforestation on Mount Tom continued up through the mid-twentieth century, with the last plantation in the Park established in 1952. In the 1970s, Mary and Laurance S. Rockefeller assumed full management of the Forest. Embracing the philosophy of "Conservation for People," the Rockefellers managed Mount Tom with an emphasis on natural resource protection, historic preservation, aesthetics, and tourism in addition to continuing the practice of sustainable forest management. By the 1970s, most of the open land had been planted or naturally regenerated, and forestry work under the Rockefellers shifted to promoting the growth and development of existing plantations and hardwood stands, and enhancing the aesthetic and recreational opportunities of the estate. The Rockefellers added miles of new trails for cross-country skiing, and encouraged the public to continue to explore and enjoy Mount Tom.

"Perception of beauty, and action to preserve and create it, are a fundamental test of a great society..."

Laurence Rockefeller, from *Catalyst of Conservation* by Robin Winks, p.195



View north from the North Ridge Road. (OCLP 2004)



### 2.1.2 ECOLOGICAL HISTORY

While the cultural dimension of forestry practiced by Billings and his heirs is critical to understanding the evolution of the Mount Tom Forest, this story is incomplete without also considering the ecological history of the site that developed over the same time.

In ecological terms, the Mount Tom Forest is a hardwood site. While part of Mount Tom was being deliberately reforested with thousands of planted seedlings, abandoned fields elsewhere on the property slowly began the transition through natural succession to a forest dominated by a mix of native species. As this process unfolded, early “pioneer” tree species such as white pine, white and gray birch, and aspen were the first to colonize the unmanaged, open fields. These trees could sprout and grow in the thick pasture grasses, tolerate nutrient poor soils, and thrive in the dry, sunny open land. As these pioneers became established, they influenced the site by adding organic material to the soil, and forming dense canopies that shaded the grasses and herbaceous plants. Under these conditions,



Pasture lands on the West Ridge were abandoned in the 1940s and began to transition to a native hardwood forest. (OCLP 2003)

the shade-tolerant tree species such as sugar maple, American beech, and eastern hemlock became established and to this day dominate the composition of the Forest. However, from Billings’ time forward, the pace and character of forest succession was also influenced by management in many parts of the Forest. As pioneer species matured, they were harvested or thinned to favor the more shade-tolerant, longer-lived hardwood species. Poor-quality and diseased trees were also removed. The resulting managed hardwood forest has readable signs that tell this story, including the high quality of remaining trees and roads used for skidding wood from the Forest.

The softwood plantations were successfully established primarily due to extensive forest clearing and lack of hardwood competition. Many of the conifer species used in the reforestation efforts, such as white pine, Norway spruce, and red pine, were selected because they grew fast, tolerated nutrient-poor soils, and competed with the grasses of the agricultural fields. These species quickly established a continuous cover that inhibited the growth of native seedlings, thus giving these planted conifers a

temporary competitive advantage over other plants that might have naturally colonized the site. However, in order to maintain the health of plantation trees, periodic thinning was required to avoid overcrowding, to prevent stagnation, and ultimately avoid loss of the plantation. The thinnings increased the amount of sunlight reaching the forest floor and resulted in a burst of regeneration from native seedlings. These partial shaded conditions, similar to those created by naturally regenerated pioneer species, supported the establishment and growth of shade-tolerant native seedlings such as sugar maple, beech, and hemlock. After thinning, plantation trees quickly responded with a growth spurt that once again closed the canopy and suppressed the growth of the native hardwood seedlings. As the plantations aged and the openings created through thinning became larger, native hardwoods eventually became a significant component of the plantation composition.



**The overstory of Stand #1 is still dominated by the European larch planted in 1887, but the young trees in the understory (regeneration) are native hardwoods. (OCLP 2004)**

Today, much of the Forest favors the regeneration and development of hardwoods and hemlock rather than planted conifers and early-successional species. As has been the case for hundreds of years, the forces of natural succession continue to combine with past and present management in shaping the composition and character of the Forest.

## 2.2 MAN AND NATURE ON MOUNT TOM

The interplay between human intention and natural processes has ultimately shaped the character of the Mount Tom Forest. Key landscape characteristics that reflect both natural and cultural processes illustrate some of the most important aspects of the Forest's historical significance. These characteristics include the landscape's patchwork of fields, hardwoods, and plantations; the diversity in forest architecture of plantations and hardwood and mixed forests; and remnant legacy trees. These integrated defining landscape characteristics, and their cultural and ecological associations, are briefly described below. More in-depth descriptions about the Forest's historical significance, cultural features, and ecological conditions can be found in Part 4: Description of the Mount Tom Forest.

**Historic Character** is the sum of all visual aspects, features, materials, and spaces associated with a cultural landscape's history (NPS 1996).



### 2.2.1 LANDSCAPE PATCHWORK

Any hiker or skier who visits Mount Tom leaves with a very basic impression: this is a diverse landscape. The character of the Forest is largely defined by a mosaic of spaces formed by the interrelationship of hills and valleys, naturally regenerated and planted forest stands, agricultural fields, and The Pogue (a 14-acre pond in the center of the Park).

This patch-like character reflects over 135 years of continuous forest management and the agricultural origin of the landscape. As visitors hike along the carriage roads and trails, they can explore the history of reforestation on Mount Tom as expressed in a diverse system of plantations of white pine, Norway spruce, red pine, European larch, and Scots pine plantations that were planted from late nineteenth century to as recently as 1952. They can also experience over sixteen different natural communities that include early-successional big-toothed aspen stands, red maple–black ash swamps, and rich northern hardwood forests of maturing American beech, sugar maple, and white ash.

The diverse qualities of the Forest are further highlighted in the way nineteenth-century landscape design was applied to create a sequence of different vistas and visual qualities that are experienced from the network of carriage roads and trails. The carriage roads track deep into dark hemlock ravines created by the Pogue Stream, and then climb to The Pogue and surrounding ridgetops to offer sweeping views out of the Park and into the surrounding Vermont countryside. The overall experience is one of contrast—natural and designed areas, open and enclosed spaces, and intimate and expansive views.

In addition to its historical value, the patchwork character of the landscape is also an important part of the Park's ecology. The diversity of the forest types and interspersed openings over a relatively small area provides valuable habitat for many wildlife species. For example, species like fishers and wood thrushes move



Views of the Elm Lot from the red pine plantation in Stand #4 and the Maple Lot from Stand #51. (OCLP 2003)



about the various forest stands; bobolinks nest in the hayfields; and the wetlands provide critical habitat to Jefferson salamanders.

For a map showing landscape patchwork characteristics, see the fold out “Landscape Patchwork” at the end of this chapter.

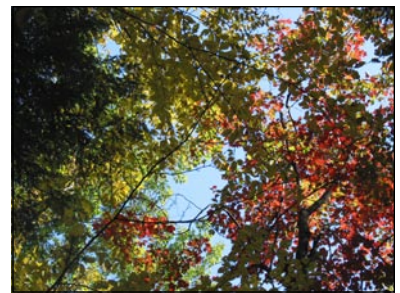
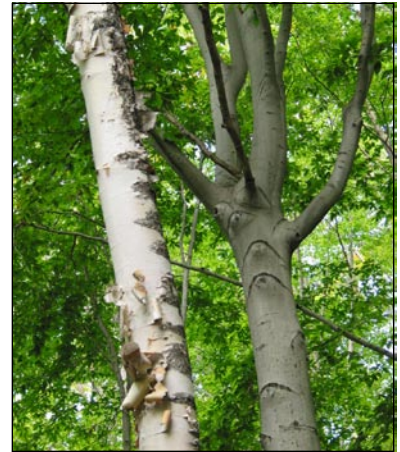
### 2.2.2 FOREST ARCHITECTURE

For the observant visitor, the diversity of the landscape is readable at even smaller scales. There are over fifty different forest stands on Mount Tom, each with a unique composition, age, and pattern of overstory trees, understory species, and trends in regeneration. The composition and structure of the stands reflect the history of reforestation and forest management activities (e.g., thinning and harvesting) on the property, the influence of aesthetics in forest management, and the response of trees to unique site conditions such as soils, aspect, and the influence of natural succession.

The plantations are diverse in their age, species composition, planting pattern, and degree to which hardwood and conifer regeneration has developed within the stand. The youngest plantations of red pine and Norway spruce can still be found as thick stands of even-aged trees aligned in a grid with their clear trunks stretching up to form a cathedral-like canopy. The understory is bare, suppressed by the dense tree crowns, and allows for sweeping views into the forest. Some of the older plantations are a mix of species, due to intentional plantings or decades of regeneration and competition. These are stands of large trees, whose trunks measure over 30 inches in diameter and heights stretch well above the other trees in the Park. Scattered beneath them are offspring of their own seed and other native hardwoods and softwoods that have regenerated naturally. In these stands, the influence of forest management appears to have mimicked some natural disturbance trends (e.g., wind throws), creating a forest stand with increased structural and species diversity.<sup>1</sup>

The diverse naturally regenerated hardwood and mixed forest stands have their own rich and complex history. Some are remnant hardwood stands that were managed woodlots during the Marsh period, while others regenerated in abandoned agricultural fields and are only fifty years old. Most are even-aged, having grown up when past agricultural fields and pastures were abandoned. However, some are remnants of marginal wetlands and riparian areas that were never cultivated and have scattered large, old trees. In other hardwood stands, remnants of former homestead plantings, such as apple trees, sugar maples, and locusts, can be found scattered amongst early-successional hardwoods.

The decades of forest management have influenced the structure of many plantations and hardwood and mixed forest stands. Some stands have developed greater vertical diversity as intentional forest thinning and natural aging of the



From top: American beech and white birch in Stand #33; hardwoods in Stand #37b; apple tree in Stand #12. (OCLP 2003, 2004)

stands opened up the canopy, increasing light for trees in the understory. In other cases, forest management has perpetuated even-aged characteristics or reduced the amount of understory vegetation to provide views into the forest from along the carriage roads.

The complex structure of the Forest is a living record of the interplay of human management and natural forces, which provides a diversity of wildlife habitats and other ecological functions.

For a map showing the types of stands, see the fold out map “Cover Types” at the end of this chapter.

### **2.2.3 LEGACY TREES**

Mount Tom is also a forest of big, old trees that have stood witness to the march of history. As the trees grew through the centuries, their trunks and branches



**Sugar maples such as this tree amongst the red pines in Stand #4 gesture to past agricultural land uses. (MABI 1998)**

recorded the changes in land use and succession. Those stories are readable to visitors who seek these big trees out and carefully study them. Scattered along the Pogue ravine and around wetlands are sturdy 300–400-year-old hemlocks towering above the canopy, reminders of the pre-settlement forest. Their large lower branches first stretched outward horizontally in response to early forest clearing, and then abruptly turned upward as the surrounding forest began to close in. Elsewhere, in the middle of stands that were once pastures, old sugar maples display a wild, gnarled structure that they developed as they grew uninhibited by the competition of other trees.

There are also legacy trees that were intentionally planted as part of the design of the carriage roads and development of the estate. For example, some of the earliest Norway spruce planted by Frederick Billings form stately allées that mark the carriage road gateways around the Mansion Grounds and the old farm roads that once served the Hilltop Farm at the French Lot. In other areas, lines of old sugar maples stretch out along the carriage roads and mark the boundaries of open fields.



In addition to being a testament to changes in land use throughout the Park's history, these big legacy trees also enrich the Park's biological systems. They provide nesting cavities utilized by a host of bird and mammal species including woodpeckers, bats, raccoons, and porcupines, as well as moist cover for amphibians. The decaying trunks house abundant populations of insects, lichens, and fungi that in turn become food for a diversity of animals. Legacy trees also enhance the Forest's structure and provide habitat to species that prefer late-successional forest characteristics for cover and breeding.

For locations of legacy trees, see the fold out map "Legacy Trees" at the end of this chapter.

#### **2.2.4 THE NATURE OF CHANGE ON MOUNT TOM**

The forest character we see today is only a snapshot in time; the nature of forest change is constant. The plantations, hardwood stands, and legacy trees are moving along their own unique trajectories influenced by the long history of agricultural and forest management activities, the dynamics of tree growth and aging, competition and disease, and the availability of light, soil, water, and nutrients. For example, the remaining even-aged, single-species plantations, which are the oldest remaining testaments to pioneering reforestation techniques in the United States, will eventually reach their maturity and face strong competition from native hardwood trees. The reestablishment of plantations and suppression of native seedlings is difficult because the landscape of today is quite different from the one Billings and his heirs reforested. Where there were once only sun-scorched hillsides of sparse pasture grasses, there are now thick, mature forests that offer moist, shady growing conditions. Soils that were once worn thin and depleted of nutrients are now enriched from decades of leaf litter decomposing on the forest floor. And, where there were once only scattered remnant native trees dotting the barren hillsides, there are now diverse, dense stands of native trees casting an abundance of seeds that are ready to take advantage of the enriched growing conditions.

### **2.3 CHALLENGES IN DEVELOPING AND APPLYING AN INTEGRATED MANAGEMENT APPROACH FOR THE MOUNT TOM FOREST**

The overarching challenge in planning for the future of the Mount Tom Forest is to manage this nationally significant cultural landscape as a dynamic cultural and natural system that is continually shaped over time by both human and ecological forces. These changes unfold over decades, if not centuries, and require management approaches that envision change beyond typical planning horizons.

"The separation of nature and culture – of people from the environment which surrounds them – which has been a feature of western attitudes and education over the centuries, has blinded us to many of the interactive associations which exist between the world of nature and the world of culture."

Adrian Phillips, IUCN's World Heritage Advisor

Virtually all cultural landscapes evolve from or are dependent on natural resources. In many ways, the dynamic qualities inherent in natural systems are what differentiate cultural landscapes from other cultural resources. Plant and animal communities associated with human settlement and use are considered biotic cultural resources and can reflect social, functional, economic, ornamental, or traditional uses of the land. Within a cultural landscape, biotic cultural resources are recognized either as a system or as individual specimen features that contribute to the landscape's significance. For example, the preservation of a single tree in a historic designed landscape may be critical to the integrity of the overall design.... In contrast, an entire woodland may have significance, so that preserving the ecological processes of the system rather than individual trees or animals becomes paramount (NPS 1998, pp. 103–4).

“Cultural landscapes often reflect specific techniques of sustainable land-use,...and a specific spiritual relation to nature. Protection of cultural landscapes can contribute to modern techniques of sustainable land-use and can maintain or enhance natural values in the landscape. The continued existence of traditional forms of land-use supports biological diversity in many regions of the world...”

IUCN World Heritage guidelines, Section 38 (1994)

Few models exist that attempt to integrate approaches from both natural and cultural resource management to work with the long-term dynamic qualities of landscapes. Management of cultural landscapes such as the Mount Tom Forest requires innovative approaches to preservation that include a greater understanding of natural systems and broader social histories. Cultural landscapes are defined by relationships that humans have developed with a place over time and the material evidence of those relationships. These relationships are characterized by patterns and interactions, rather than solely by physical features. Landscape characteristics encompass ecological and cultural attributes, broad landscape patterns, continuing cultural traditions, and diverse values held by past stewards and current visitors.

These landscapes offer unique opportunities for biodiversity conservation and ecosystem management. The pervasiveness of human influences on landscapes, especially in areas with a long cultural history, requires recognition of ecological values that exist in a mosaic of land uses and attention to the role of disturbance—either natural or human-generated—in shaping ecological systems. Examining these relationships can lead to a greater understanding of and appreciation for the role of humans within, rather than apart from, the natural environment.

Four key questions continually surfaced in discussions about the complex interrelationships between nature and culture on Mount Tom:

- How can the “readable” history and essential character of the Forest be retained by working with the dynamics of forest growth and change?
- How can knowledge of natural and cultural systems be integrated to shape an effective, enlightened management strategy for this nationally significant site?
- Can we successfully retain enough of the Forest’s historic character while also preserving the integrity of other important aspects of the landscape including its biodiversity, habitat, water quality, and recreational opportunities?
- How can we cultivate a civil dialogue and use this public land to demonstrate a path to sustainability and offer unique educational opportunities about conservation stewardship?

These questions were used to guide the development of the management vision and goals that are discussed in the next chapter. A more detailed list of management considerations identified during the scoping process is provided in Appendix A.

## ENDNOTE TO PART 2

<sup>1</sup> Keeton 2005.